THREE NEW GENERA AND FIVE NEW SPECIES OF PARASITIC CRUSTACEA

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INTRODUCTION

In the course of a study of the decapod crustacea parasitized by rhizocephalids, contained in the collection of the United States National Museum, several unique forms were observed by Dr. H. Boschma, of Leiden, Netherlands. These were entrusted to the authors for determination, together with another species sent direct to us from Washington.

Puzzling as the material at first proved to be, we believe we should make it known an apparently new genus and species of Epicarid, *Faba*, new genus with *F. setosa* as the genotype; a new genus and species of parasite of *Spirontocaris* of problematical systematic affinities; *Heptalobus*, new genus with *H. paradoxus* as the genotype; and a new rhizocephalid, *Duplorbis ocarina*, parasitic on *Hemiarthus abdominalis* (Krøyer), itself a parasite of *Spirontocaris*, another case of double or secondary parasitism.

The description of a second species of *Faba*, *F. glabra*, belonging to the Bishop Museum, Honolulu, is also given here, as it is the only other known representative of this new genus.

A new species and the type of a new genus of Epicarid from China, *Apocepon pulcher*, is also described.

SYSTEMATIC DISCUSSION

FABA, new genus

Male, unknown; described from the female:

Body bean-shaped; almost wholly filled with eggs or embroyos so far as can be ascertained; near the proximal extremity a trunk

which terminates in an anchorlike head of four teeth; by means of these teeth, which are sunk into the body of the host, the animal is fastened to the latter. On the body are various lines of thickened chitin, but whether or not these have anything to do with the original segmentation can not be determined. The two known species of this genus are parasitic on Alpheidae [Crangonidae] and Hippolytidae.

The systematic position of the genus *Faba* is somewhat doubtful. The embryos of *F. glabra* certainly are those of copepods; and no doubt *Faba* belongs to the Epicaridea. Absolute certainty must, however, wait until the development of the male is known. Accepting *Faba* for the present as an Epicarid, there can be little doubt that this "simple sac filled with eggs" (Richardson, p. 497) belongs to the Tribe Cryptoniscinae. But great difficulties arise in assigning it to any particular family. The greater part of the families suggested by Bonnier contain often very few species, sometimes only one species, and these are not always thoroughly known. Hence a clear analysis of the families is often lacking. In one respect, however, Bonnier was very positive; each family is related to a different group of hosts.

Faba has very few characters; they are of no value in placing it in any of the families now known. Nor can this problem be solved by means of the host, for no family of the Cryptoniscinae is known to prey directly upon decapods, although some forms of *Danalia* (Liriopsidae) are often found associated with the former. But in these cases a rhizocephalid is the true host, the *Danalia* perforating the body-wall of the decapod in order to attach itself to the "root" of the rhizocephalid, though this is not always the case. It seems that some of these forms have ultimately become parasites of decapods. It is possible that *Faba* represents such a case, and it is true that the mode of attachment of the latter bears a striking resemblance to *Danalia*. As we have no other reason to suppose that *Faba* is, or has been, a parasite of Rhizocephala, we do not feel justified in regarding it as such. Nor do we set enough value upon the resemblance of the trunk of both forms to regard *Danalia* and *Faba* as allied. Only the study of the evolution of the female will enable us to decide the correct systematic position of *Faba*.

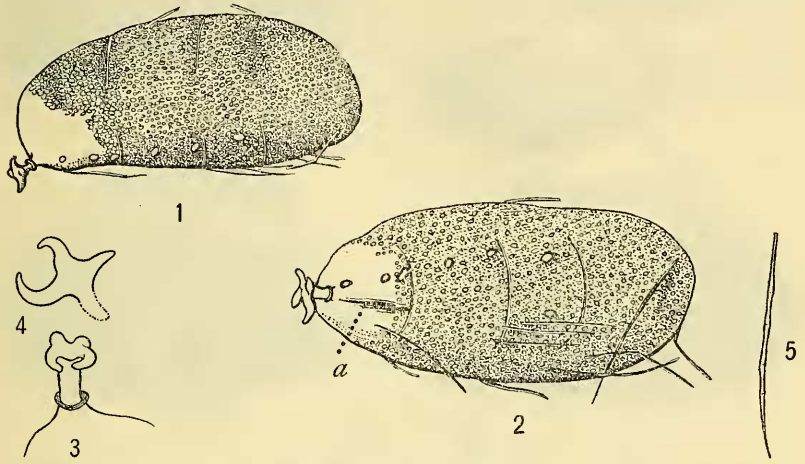
FABA SETOSA, new species

Holotype.—Cat. No. 62732, U.S.N.M. One female on *Spirontocaris bispinosa* Holmes.

Type locality.—*Albatross* Station 3170, off Central California, 38° 17′ N.; 123° 29′ W.; March 28, 1890; 167 fathoms, mud bottom.

Description.—Length, 8 mm. The body, especially the ventral side, is sparsely set with long setae. They are irregularly scattered,

generally directed backwards, and seem to be articulated. The trunk is placed quite near to the oral extremity; it terminates in two longer teeth, directed to the right side of the body, and two smaller ones directed to the left. Around the trunk, near to the body runs a thick ring of a dark brown colour. The body is transparent, with the exception of the rostral part. Only three crosslines are visible on the dorsal and ventral surfaces. On the left side of the latter a row of six tubercles occurs; on the right side only one is to be seen, but it is possible that the others are smaller, so that they can not be distinguished from the embryos, moreover the dorsal part



FIGURES 1–5.—FABA SETOSA, FEMALE, 1, FROM THE LEFT SIDE; 2, FROM THE VENTRAL SIDE; 3, TRUNK; 4, TEETH OF TRUNK; 5, SETA

on the right side is somewhat damaged (*a*, fig. 2). The tubercles may be vestiges of the thoracopods or papillae, as Caulléry has described for *Danalia* (Caulléry, p. 606).

FABA GLABRA, new species

Holotype.—One female on an Alpheid shrimp (*Crangon*). (Type in the Bishop Museum.)

Type locality.—Waikiki Reef, Honolulu. Dr. C. H. Edmonston, collector.

Description.—Length, 6 mm. The dorsal surface is somewhat damaged (*a*, figs. 6–11). The trunk is situated a little behind the rostral extremity. It is longer than the trunk of *setosa*. The teeth consist of one larger pair directed forward, and a very small pair directed backward (fig. 11). On the ventral surface, in the median part, the wall of the body is opaque and more or less folded. On the remainder of the body an extensive system of lines is to be seen, consisting of a number of crosslines and some longitudinal lines. The

number of these crosslines on the left and right sides of the body differs. The lines are not symmetrically disposed. It may be remarked that they divide the body, at least at the sides, into eight parts, situated one behind the other. Here and there, at the intersections of the longitudinal and transverse lines, small triangular areas are formed.

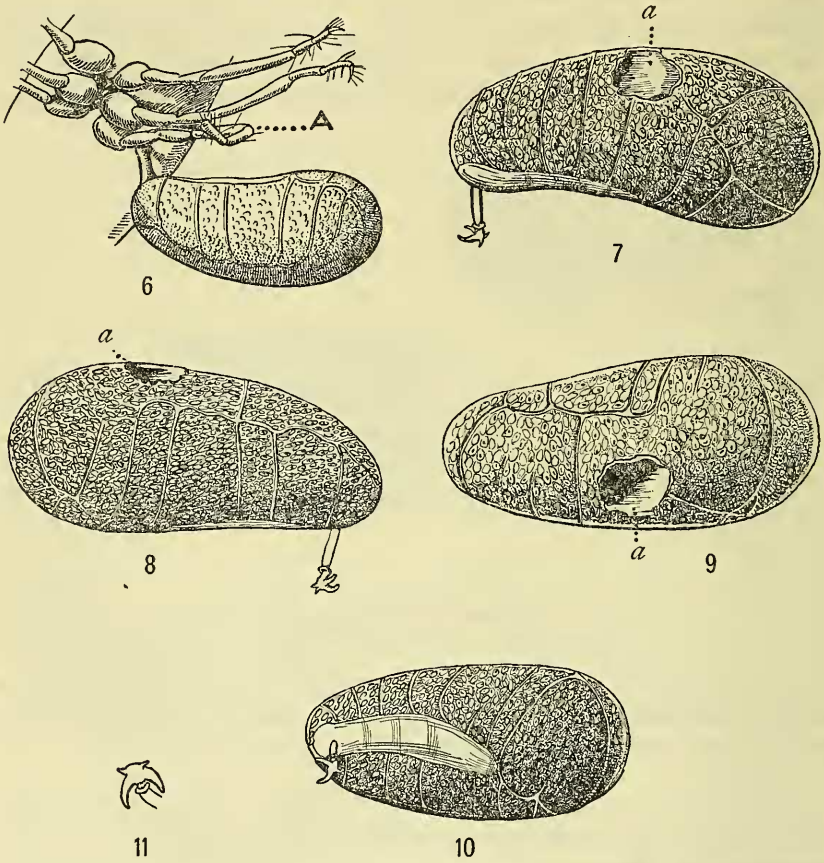


FIGURE 6–11.—FABA GLABRA, FEMALE, 6, ON HOST; *a*=THORACOPOD VIII; 7, FROM THE LEFT SIDE; 8, FROM THE RIGHT SIDE; 9, DORSAL VIEW; 10, VENTRAL SIDE; 11, EXTREMITY OF TRUNK

HEPTALOBUS, new genus

This genus is founded on the female of the species, parasitic in the branchial cavity of *Spirontocaris biunguis* Rathbun and *Spirontocaris suckleyi* (Stimpson). Although forms with seven lobes and forms with five lobes are found, we regard both as belonging not only to the same genus, but also to the same species, as both forms are found on the same host, and, except for the development of

dorsal lobes, both agree perfectly. It is therefore probable that the smaller specimens are younger and would have developed dorsal lobes in a later stage, especially as slight indications of sixth and seventh lobes are sometimes to be seen.

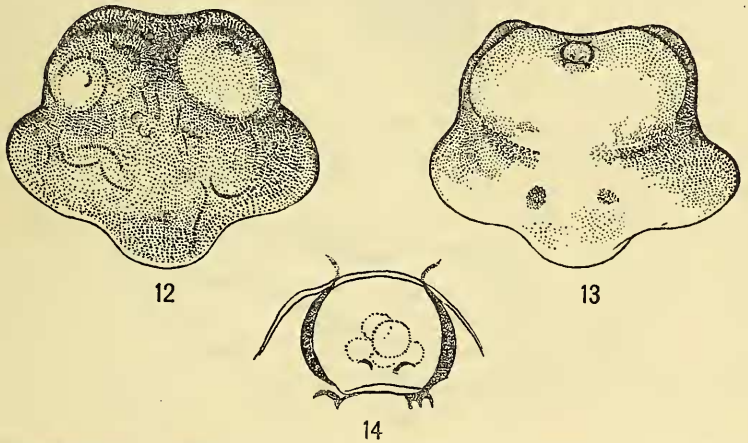
The systematic position of this organism is quite unknown. Its characters furnish no clue as to its relationships. Only a knowledge of the development and the evolution of the female will answer this question.

The largest specimen is 3½ mm. long and has a breadth of 4 mm.

HEPTALOBUS PARADOXUS, new species

Holotype.—Cat. No. 62733, U.S.N.M. A female with seven lobes on *Spirontocaris biunguis* Rathbun.

Type locality.—*Albatross* Station 3329, Bering Sea, 53° 56′ 50″ N.; 167° 08′ 15″ W., August 21, 1890, 399 fms.



FIGURES 12–14.—HEPTALOBUS PARADOXUS, FEMALE, 12, DORSAL VIEW; 13, VENTRAL SIDE; 14, MOUTH PARTS (?)

Additional material, a second female with five lobes, also on the host of the type; and four females on *Spirontocaris suckleyi* (Stimpson) each with five lobes, *Albatross* Station 2842, between Unalaska and Cook Inlet, Aleutian Islands.

The construction of the ring on the ventral surface can be studied in detail on Figure 14. It consists of two dark colored lateral clasps, which surpass rostrally and caudally a line of thickened chitin. Caudally these clasps seem to terminate in two or three teeth. The rostral line of chitin surpasses the clasps laterally. Between the ring some circles, also of thickened chitin, and two curved dark lines are visible.

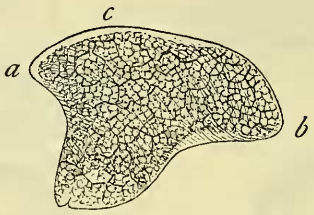
On the dorsal surface of the figured specimen various lines are found, partly indicative of the organs located beneath the surface of

the body. The proximal dorsal lobes show each a slight depression near to the frontal margin; on the left one, a circle can be traced. On the ventral surface two depressions are found on the extremities of the caudal and the lateral lobes.

With other specimens these depressions and lines are missing or differently traced, so that no great importance can be attached to them.

DUPLORBIS OCARINA, new species

Several females on *Hemiarthrus abdominalis* (Krøyer) on *Spirontocaris arcuata* Rathbun, *Albatross* Station 2842, between



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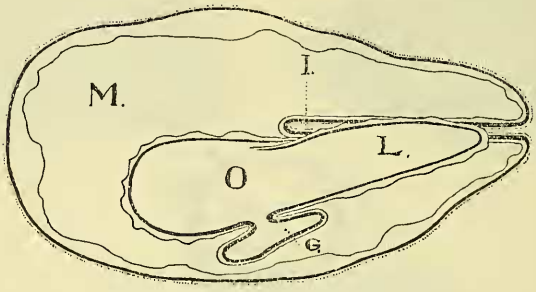

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FIGURES 15–16.—DUPLORBIS OCARINA, FEMALE, 15, LEFT SIDE. FOR *a* AND *b* SEE TEXT; FOR *c* AND *d* SEE EXPLANATION OF FIGURE 16. 16, TRANSVERSE SECTION THROUGH FEMALE CORRESPONDING WITH THE LINE *c–d*, FIGURE 15; SCHEMATIC. I, INTESTINE; L, LOBE OF OVARY; M, MARSUPIAL POUCH; O, OVARY

Unalaska and Cook Inlet, Aleutian Islands 54° 15′ N., 166° 05′ W., July 23, 1888, 72 fathoms; pebbles; of these the largest has been selected as the holotype (Cat. No. 62734 U.S.N.M.). The species is parasitic in the branchial cavity of *Hemiarthrus abdominalis* Krøyer. The male is unknown.

The body consisting of three lobes has the shape of an ocarina, a well-known musical instrument. By means of the lobe corresponding with the mouthpiece of that instrument, the animal is attached to its host. At the extremity of this lobe is a little incision corresponding to the mouth opening. The surface of the body has a

netlike appearance, caused by the eggs in the brood pouch. The largest specimen is 4 mm. long (between *a* and *b*, fig. 15).

Regarding the internal organization, the following can be said: The intestine (I) is poorly developed; only a portion of it is present, opening through the oral incision. Distally it is closed. To the left and right of the intestine lies a lobe (L) of the ovary; at some distance beyond the closed extremity of the intestine, these lobes unite to form the unpaired part of the ovary (O). At one side (the ventral side?) the ovary shows two processes (G), lined with large epithelial cells. Their inner surface is covered with a cuticle. They are in communication with the unpaired part of the ovary, being shut off from the rest of the body. The remainder of the body is occupied by the very large brood pouch.

According to van Kampen and Boschma, *Duplorbis* (p. 59) belongs to the Rhizocephala and in nearly all respects, in shape as well as in structure, our animal corresponds with that genus. Of *Duplorbis* two species are known, namely, *D. calathurae* Smith and *D. smithi* Nierstrasz and Brender à Brandis.

These three forms each have two oviducts by means of which the ripe ova pass from the ovary into the brood pouch. In *D. ocarina*, however, we have not been able to trace this communication. We might consider the two appendices (G) as oviducts, but these bodies do not appear to be in communication with the brood pouch. Notwithstanding this, we are inclined to regard them as oviducts, particularly as their internal surface is lined with a cuticle. As the brood pouch is filled with embryos, there must have been some connection with the ovary, and in our opinion, at least, through the processes referred to above. They probably close after the passage of the eggs, to reopen when the ovary is again ripe for the next periodical set of ova.

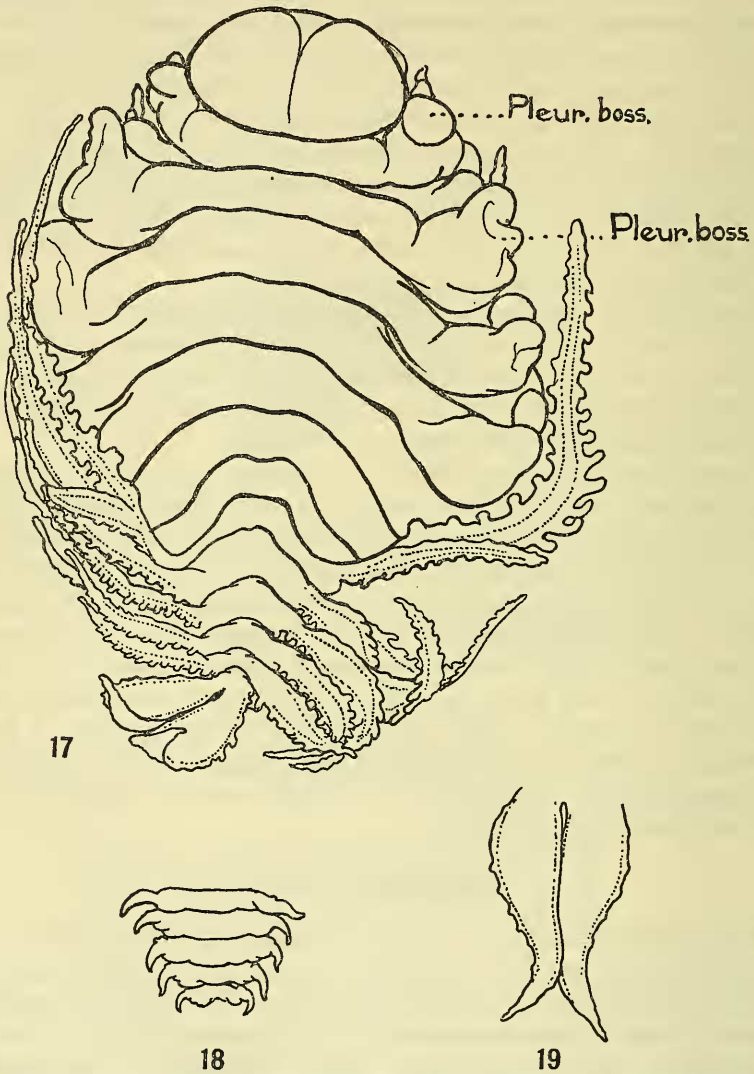
APOCEPON, new genus

For generic characters we have: *Female:* Pleural lamellae on abdominal segments I–V; lamellae elongate, and digitate (principally on caudal margin); exopods of pleopods long and digitate; endopods very short (rudimentary) and smooth; without mediodorsal bosses on peraeon or pleon. *Male:* Pleotelson markedly bifurcate; no rudiments of pleopods or uropods present; no medio-ventral bosses.

This genus is closely allied to *Trapezicepon*[1] and maybe to *Leidya*, in so far as the endopods (of the pleopods) of the latter are rudimentary, which can not be clearly made out in reading Leidy's de-

[1] Bonnier, J.: Contribution à l'étude des Epicarides. Les Bopyridae. Paris, 1900, p. 269.

scription or in studying his figures.[2] In fact, the females of *Trapezicepon* and *Apocepon* can only be separated in such minor points as the frontal lamina of the cephalon—which is large with *Trapezicepon*



FIGURES 17–19.—APOCEPON PULCHER, FEMALE, 17, DORSAL VIEW; 18, VENTRAL VIEW OF ABDOMEN WITHOUT PLEURAL LAMELLAE, EXOPODS, AND UROPODS; 19, UROPODS

and absent with *Apocepon;* the length of the exopods of the peopods—longer with *Apocepon* than with *Trapezicepon;* and the habi-

[2] Journ. Acad. Nat. Sci. Phila., ser. 2, vol. 3, 1855, p. 150, pl. 11, figs. 26–32, quoted in H. Richardson, A Monograph on the Isopods of North America, Bull. 56, U. S. Nat. Mus., Washington, 1905, p. 511

tus—*Trapezicepon* is more thickset. With *Leidya* it differs also in the absence of a frontal lamina, whereas the uropods of the latter are much narrower.

The chief differences with these genera lie in the male: The male of *Trapezicepon* has rudimentary pleopods, whereas the male of *Leidya* has "peculiar ventral appendages" (Leidy) and long uropods. Moreover the male of *Trapezicepon* has a medio-ventral boss on the thoracic segments and the first abdominal segment.

APOCEPON PULCHER, new species

Holotype.—Cat. No. 62961, U.S.N.M. One female with male on *Philyra pisum de* Haan. Tsingtau, China; T. Urita coll.

Description of Female.—Length (without uropods) 8 mm.; breadth 5½ mm. Without eyes. Body more or less ovoid; cephalon clearly bilobed. Pleural bosses (ovarian bosses) very prominent and wrinkled, but generally not clearly set off. Coxal plates absent. Exopods of first pair of pleopods very long, reaching to the second thoracic segment. Remaining exopods on the longer side of the animal also very long, reaching to the third, fourth, fifth, and sixth segments, respectively. Those of the shorter side much shorter. Endopods linguiform. At the longer side, the pleural lamella of the first abdominal segment is about one-third or one-fourth of the length of the exopod; remaining pleural lamellae somewhat longer than the first. Uropods very broad in the middle, and with the extremity turned outward.

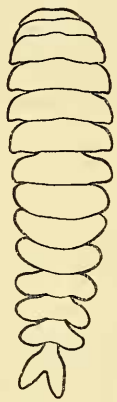


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FIGURE 20.—APOCEPON PULCHER, MALE, DORSAL VIEW

Description of Male.—Length 3½ mm. Slender, and somewhat tapering caudally. Eyes absent. Pleotelson V-shaped, and as long as the abdominal segments IV and V together.

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